CLAIMS

We claim:

1. A method for digitally processing transform data representing a phenomenon, the method comprising:

performing an inverse transform of said transform data to the real domain forming high-precision numbers; and

manipulating said high-precision numbers to produce an effect.

2. A method as recited in claim 1, further comprising converting said high-precision numbers to integers and clipping the integers to an allowed range forming converted data.

3. A method as recited in claim 1, wherein the phenomenon is an image.

4. A method as recited in claim 1, wherein said effect is the chroma-key merging of two data sets.

5. A method as recited in claim 1, wherein said effect is the color correction of image data.

6. A method as recited in claim 3, wherein said effect is a 90 degree rotation of the image.

7. A method as recited in claim 1, wherein said high-precision numbers are floating point numbers.

8. A method as recited in claim 1, wherein said high-precision numbers are fixed precision numbers including a fractional part.

9. A method as recited in claim 1, wherein the step of performing employs an inverse discrete cosine transform.

10. A method as recited in claim 1, wherein the step of performing employs an inverse discrete wavelet transform.

11. A method as recited in claim 1, wherein the step of performing employs an inverse discrete Fourier transform.

12. A method for digitally processing transform data in the real domain representing a phenomenon, the method comprising:

performing an inverse transform of said transform data to the real domain forming high-precision numbers; and

performing a forward transform of said high-precision numbers.

13. A method as recited in claim 12, wherein the inverse to said forward transform is different from said inverse transform.

14. A method as recited in claim 13, wherein said forward transform is a forward discrete cosine transform and said inverse transform is an inverse discrete wavelet transform.

15. A method as recited in claim 1, further comprising implementing an inverse quantization of transform-coded data forming the transform data.

16. A method as recited in claim 15, further comprising converting said high-precision numbers to integers and clipping the integers to an allowed range forming converted data.

17. A method as recited in claim 15, further comprising entropy decoding coded data to form the transform-coded data

18. A method as recited in claim 17, wherein said coded data are coded image data.

19. A method as recited in claim 17, wherein said coded data are coded video data.

20. A method as recited in claim 18, wherein said coded image data are in a JPEG still image international standard format.

21. A method as recited in claim 19, wherein said coded video data are in a MPEG motion video international standard format.

22. A method as recited in claim 15, wherein the step of performing employs an inverse discrete cosine transform.

23. A method as recited in claim 15, wherein the step of performing employs an inverse discrete wavelet transform.

24. A method as recited in claim 15, wherein the step of performing employs an inverse discrete Fourier transform.

25. A method as recited in claim 15, wherein said high-precision numbers are fixed precision numbers that include a fractional part.

26. A method as recited in claim 12, further comprising manipulating said high-precision numbers to produce an effect.

27. A method for digitally processing transform-coded data representing a phenomenon, the method comprising:

performing an inverse quantization of the transform-coded data forming transform data;

performing an inverse transform of said transform data to the real domain forming high-precision numbers;

performing a forward transform of said high-precision numbers forming forward transformed data; and

performing a quantization of said forward transformed data forming quantized data.

28. A method as recited in claim 27, further comprising:

entropy decoding coded data forming transform-coded data employing entropy decode; and

entropy encoding the quantized data employing entropy encode forming encoded data.

29. A method as recited in claim 27, further comprising manipulating said high-precision numbers to produce an effect.

30. A method as recited in claim 27, further comprising converting said high-precision numbers to integers and clipping to an allowed range forming converted data.

31. A method as recited in claim 29, further comprising alternating manipulating steps with the steps of performing a forward transform, performing a quantization, entropy encoding, entropy decoding, performing an inverse quantization, and performing an inverse transform a desired number of times.

32. A method as recited in claim 31, wherein said coded data are compressed data, and each step of alternating implements a compression/decompression cycle.

33. A system employing the method recited in claim 31, wherein each step of alternating recompresses and decompresses coded data to enable an editing operation.

34. A method as recited in claim 28, wherein said coded data are coded audio data.

35. A method as recited in claim 28, wherein said coded data are coded electromagnetic environment data.

36. A method as recited in claim 28, wherein said coded data are coded video data.

37. A method as recited in claim 28, wherein said coded data is encoded in the JPEG standard format.

38. A system for digitally processing first level transform-coded data in the real domain representing a phenomenon, the system comprising:

a first inverse quantizer to generate transform data from said transform-coded data;

a first inverse transformer to produce an inverse transform of said transform data to the real domain forming high-precision numbers;

a first forward transformer for forward transforming said high-precision numbers forming forward transformed data; and

a first quantizer for quantizing said forward transformed data to form quantized data.

39. A system as recited in claim 38, wherein the forward transformer employs a different transform type than a first transform type employed by the inverse transformer.

40. A system as recited in claim 38, wherein said forward transformer produces a forward discrete cosine transform and said inverse transformer produces an inverse discrete wavelet transform.

41. A system as recited in claim 38, further comprising:

a manipulator for manipulating the high-precision numbers to produce an effect.

42. A system as recited in claim 38, wherein said inverse quantizer and said quantizer use identical quantization values.

43. A system as recited in claim 41, wherein only a subset of the quantized transform data produced different transform-coded data.

44. A system as recited in claim 38, wherein said inverse quantizer and said quantizer use at least one different quantization value.

45. A system as recited in claim 38, further comprising:

an entropy decoder to form the transform-coded data from coded data; and

an entropy encoder to encode the quantized data.

46. A system for digitally processing transform data representing a phenomenon, the system comprising:

an inverse transformer to perform an inverse transform of the transform data to the real domain using high-precision numbers; and

a manipulator to manipulate the high-precision numbers to produce an effect.

47. A system as recited in claim 46, further comprising a converter to convert said high-precision numbers to integers, and a clipper to clip the integers to an allowed range.

48. A system for digitally processing transform-coded data representing a phenomenon, the system comprising:

an inverse quantizer to perform an inverse quantization of said transform-coded data to form transform data;

an inverse transformer to perform an inverse transform of said transform data to the real domain forming high-precision numbers; and

a manipulator for manipulating the high-precision numbers to produce an effect.

49. A system as recited in claim 48, further comprising a converter to convert said high-precision numbers to

integers, and a clipper to clip the integers to an allowed range.

50. A system for digitally processing transform data in the real domain representing a phenomenon, the system comprising:

an inverse transformer to produce an inverse transform of the transform data to the real domain to form high-precision numbers; and

a forward transformer to forward transform the high-precision numbers.

51. A system as recited in claim 50, further comprising:

a manipulator to manipulate the high-precision numbers to produce an effect.

52. A system as recited in claim 41, wherein the quantized data forms an other level of transform-coded data and further comprising:

another inverse quantizer, another inverse transformer, another manipulator, another forward transformer, and another quantizer to perform together a similar function on the other level of transform-coded data as performed on the first level transform-coded data.

53. A system as recited in claim 52, wherein the effect produced by the first manipulator is a different type of effect from that produced by the other manipulator.

54. A system as recited in claim 52, wherein the functions of the first inverse quantizer, first inverse transformer, first forward transformer, and first

quantizer, and the respective functions of said another inverse quantizer, another inverse transformer, another forward transformer, and another quantizer are each performed by a same module.

55. A method as recited in claim 2, further comprising providing said converted data for use by an output device.

56. A method as recited in claim 55, wherein the output device is a display monitor.

57. A method as recited in claim 55, wherein the output device is a raster display monitor.

58. A method as recited in claim 1, wherein the transform data includes information of a spectral analysis.

59. An article of manufacture comprising a computer usable medium having computer readable program code means embodied therein for digitally processing transform data representing a phenomenon, the computer readable program code means in said article of manufacture comprising computer readable program code means for causing a computer to effect:

performing an inverse transform of said transform data to the real domain forming high-precision numbers; and

manipulating said high-precision numbers to produce an effect.

60. An article of manufacture as recited in claim 59, the computer readable program code means in said article of manufacture further comprising computer readable

program code means for causing a computer to effect converting said high-precision numbers to integers and clipping the integers to an allowed range forming converted data.

61. An article of manufacture as recited in claim 59, wherein the phenomenon is an image.

62. A computer program product comprising a computer usable medium having computer readable program code means embodied therein for digitally processing transform data in the real domain representing a phenomenon, the computer readable program code means in said computer program product comprising computer readable program code means for causing a computer to effect:

performing an inverse transform of said transform data to the real domain forming high-precision numbers; and

performing a forward transform of said high-precision numbers.

63. A computer program product as recited in claim 62, wherein the inverse to said forward transform is different from said inverse transform.

64. A computer program product as recited in claim 62, wherein said forward transform is a forward discrete cosine transform and said inverse transform is an inverse discrete wavelet transform.

65. A program storage device readable by machine, tangibly embodying a program of instructions executable by the machine to perform method steps for digitally

processing transform-coded data representing a phenomenon, said method steps comprising:

performing an inverse quantization of said transform-coded data forming transform data;

performing an inverse transform of said transform data to the real domain forming high-precision numbers; and

manipulating said high-precision numbers to produce an effect.

66. A computer program product as recited in claim 65, the computer readable program code means in said computer program product further comprising converting said high-precision numbers to integers and clipping the integers to an allowed range forming converted data.

67. A program storage device readable by machine, tangibly embodying a program of instructions executable by the machine to perform method steps for digitally processing transform-coded data representing a phenomenon, said method steps comprising:

performing an inverse quantization of the transform-coded data forming transform data;

performing an inverse transform of said transform data to the real domain forming high-precision numbers;

performing a forward transform of said high-precision numbers forming forward transform data; and

performing a quantization of said forward transformed data forming quantized data.

68. A program storage device readable by machine as recited in claim 67, said method steps further comprising manipulating said high-precision numbers to produce an effect.

69. A program storage device readable by machine as recited in claim 67, said method steps further comprising converting said high-precision numbers to integers and clipping to an allowed range forming converted data.

70. A program storage device readable by machine as recited in claim 67, said method steps further comprising:

entropy decoding coded data forming transform-coded data employing entropy decode; and

entropy encoding the quantized data employing lossless entropy encode forming encoded data.

71. A program storage device readable by machine as recited in claim 70, said method steps further comprising alternating said manipulating steps with said steps of performing a forward transform, performing a quantization, entropy encoding, entropy decoding, performing an inverse quantization, and performing an inverse transform a desired number of times.

72. A program storage device readable by machine as recited in claim 71, wherein said coded data are compressed data, and each step of alternating implements a compression/decompression cycle.

73. A program storage device readable by machine as recited in claim 70, wherein the phenomenon is image data encoded in the JPEG standard format.

74. A method for digitally processing transform data in the real domain representing a phenomenon, the method comprising:

performing an inverse transform of said transform data to the real domain forming high-precision numbers;

converting the high-precision numbers to integers which include out of range data; and

performing a forward transform of the integers forming forward transformed data.

75. A method as recited in claim 74, further comprising manipulating the integers to produce an effect.

76. A method as recited in claim 74, further comprising:

performing an inverse quantization of transform-coded data to form the transform data; and

performing a quantization of said forward transformed data forming quantized data.

77. A method as recited in claim 74, further comprising clipping the integers to an allowed range forming converted data.

78. A method as recited in claim 76, further comprising alternating manipulating steps with the steps of performing a forward transform, performing a quantization, performing an inverse quantization, and performing an inverse transform a desired number of times.

79. A program storage device readable by machine, tangibly embodying a program of instructions executable by the

machine to perform method steps for digitally processing transform data in the real domain representing a phenomenon, said method steps comprising:

performing an inverse transform of said transform data to the real domain forming high-precision numbers;

converting the high-precision numbers to integers which include out of range data; and

performing a forward transform of the integers forming forward transformed data.

80. A program storage device readable by machine, as recited in claim 79, further comprising manipulating the integers to produce an effect.

81. A program storage device readable by machine, as recited in claim 79, further comprising performing an inverse quantization of transform-coded data to form the transform data.

82. A program storage device readable by machine, as recited in claim 79, further comprising performing a quantization of said forward transformed data forming quantized data.

83. A program storage device readable by machine, as recited in claim 79, further comprising clipping the integers to an allowed range forming converted data.

84. A method as recited in claim 17, wherein said coded data are coded audio data.